PUBLIC HEALTH INITIATIVES IN HEARING:

WHAT ONE AUDIOLOGIST CAN DO

Capstone Project

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By

LAURA J. WINDER

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The Ohio State University
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Capstone Committee:

Professor Lawrence Feth, Advisor

Professor Wayne King

Professor Gail Whitelaw

Approved by

_____
Advisor

ABSTRACT

Public health initiatives stipulate a reduction in the proportion of the population with noise-induced hearing loss. These initiatives do not differentiate between occupational noise-induced hearing loss and noise-induced hearing loss incurred independently of occupational noise exposure. However, it is worthwhile to examine non-occupational noise-induced hearing loss because noise sources are varied and ubiquitous, the population at risk is so wide-ranging, it is not formally scrutinized by mandated programs or dedicated professionals to the same degree as occupational noise-induced hearing loss, and often does not utilize good principles of health communication to create concise educational messages. Audiologists can individually work to prevent non-occupational noise-induced hearing loss through education, which should involve principles of health communication and promotion, thoughtful and concise messages, the use of national messages as a springboard, and can also occur through school programs and routine office appointments. One can also contribute to the fulfillment of public health initiative by engaging in research to better quantify non-occupational noise hazards and the best methods to communicate good hearing health principles to the public.

Dedicated to

the little textbook that started it all

and the parents who weren't a bit unnerved

when audiology became my fourth major.

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VITA

December 15, 1981.	Born – Lansing, MI
June 2004.	B.S. Audiology and Speech-Language Pathology, Brigham Young University.
June 2008.	Au.D., The Ohio State University.
2002 – 2003.	Research Assistant, Brigham Young University.
2004 – 2005.	Fellow The Ohio State University.
2005 – 2007.	Research and Teaching Assistant The Ohio State University.

FIELDS OF STUDY

Major Field: Audiology
Undergraduate Minor: English
Graduate Specialization: Public Health and Epidemiology

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LIST OF ABBREVIATIONS

dBA	decibel, A-weighting
EPA	Environmental Protection Agency
NEPA	National Environmental Policy Act
NIHL	noise-induced hearing loss
NIOSH	National Institute for Occupational Safety and Health
NITS	noise-induced threshold shift
NONIHL	non-occupational noise-induced hearing loss
ONIHL	occupational noise-induced hearing loss
PSS	personal stereo system

CHAPTER 1

Introduction

For most audiologists, the profession occurs on a very individual level. Patients are usually tested one at a time. They are counseled on results individually, and most treatment and audiologic rehabilitation occurs on a one-to-one basis. Indeed, it is the personal and *inter*personal aspects of the profession that prompt many practitioners to join the ranks of hearing health professionals. We like to feel as though we make a difference daily. Someone is helped, a life is touched, and a satisfied audiologist goes home at the end of the day.

This view, however crucial, is a bit near-sighted. While individual patient care is central to the practice of audiology and remediation of the effects of hearing loss, a large scale description of the hearing health status in a population can identify important trends, causes and risk factors associated with hearing loss. This global snapshot, formally denoted as "epidemiology," can then be used to make key decisions that impact the hearing health of individuals.

Epidemiology merely describes disease in a population. Its sister, public health, is the action-oriented sibling devoted to improving quality of life based on information

about characteristics of the population gained in epidemiology. In tandem, the two describe disease and what to do about it on a large scale.

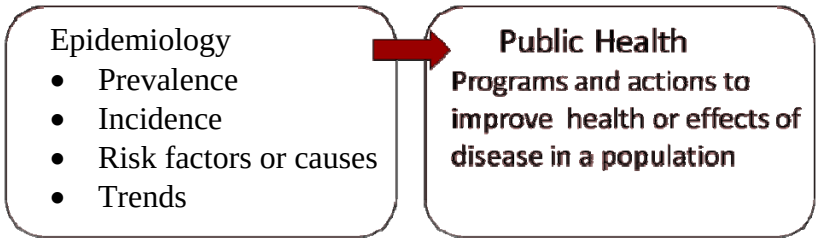

Figure 1: The relationship between epidemiology and public health.

One could describe hearing disorders in the population epidemiologically. It could be noted that twelve percent of children age seven years report experiencing tinnitus (Holgers, 2003), and almost fifteen percent of school-aged children have at least a minimal hearing loss at a given time (Niskar et al., 1998). These are all measures that tell us what is going on right now, or the *prevalence* of a disorder in the population, as well as the *incidence* of disease, or the rate of acquisition of hearing disorders.

Public health tends to be a little less arithmetic. It involves programs, actions and ideas intended to lead to changes in behaviors associated with good health. Public health may be far-removed from the mind of an independent practitioner who sees patients one at a time in a private office. While the emphasis on newborn hearing screening and early intervention may be an exception, and general hearing conservation could easily be identified as a public health concern, the average audiologist may not be aware of the personal contribution he or she can make to public health concerns in audiology.

Key issues in hearing were identified in a public health initiative that was born in the early part of the decade under the collaboration of federal agencies with input from over 600 national and state organizations, as well as the public (Healthy People 2010, n.d.). Healthy People 2010 embraces 28 national health objectives to extend and improve the quality of life. This document lists seven hearing objectives along with bench markers in areas that include newborn hearing screenings, otitis media, adult hearing screenings and rehabilitative technology such as assistive listening devices, hearing aids and cochlear implants. Three objectives (28-16, 28-17 and 28-18) pertain to noise-induced hearing loss (NIHL), particularly increasing the use of hearing protection and decreasing the prevalence of NIHL in the population. Objectives 28-17 and 28-18 aim to "[r]educe the proportion of adolescents who have elevated hearing thresholds, or audiometric notches, in high frequencies (3, 4, or 6 kHz) in both ears, signifying noise-induced hearing loss" and "[r]educe the proportion of adults who have elevated hearing thresholds, or audiometric notches, in high frequencies (3, 4, or 6 kHz) in both ears, signifying noise-induced hearing loss." (Healthy People 2010, n.d., "Midcourse Review") Not only do these objectives indicate an awareness of the hazards of noise on hearing; by aiming to decrease the prevalence of the condition, they acknowledge 1) that it is preventable, a point emphasized repeatedly in NIHL literature (American Academy of Audiology [AAA], 2003; National Institute for Occupational

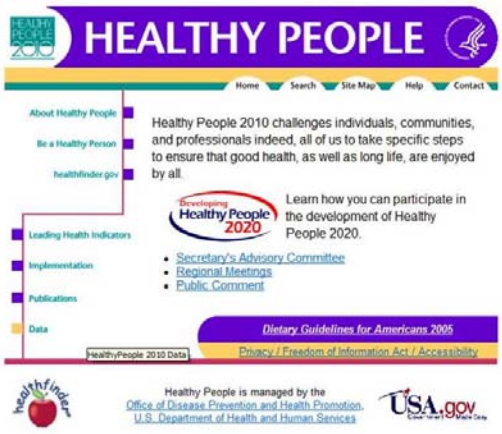

Figure 2: Healthy People 2010 Web site
Note: Healthy People 2010. (n.d.). Retrieved May 7, 2008 from Healthy People 2010 Web site, http://www.healthypeople.gov/default.htm

Safety and Health [NIOSH], 1996), and 2) that the target audience for Healthy People 2010 can actively participate in preventive measures.

The Healthy People objectives are a good start, but do not differentiate between occupational and non-occupational NIHL (ONIHL and NONIHL). The differentiation is crucial, because non-occupational noise exposure does cause hearing loss and the problem by and large receives little attention. Even if we make an assumption that the significant proportion of noise exposure in adults is job-related, we cannot extend this assumption to children and adolescents. Furthermore, hearing conservation techniques and programs designed for the workplace are ill-suited and inappropriate for general implementation. It is most definitely in the scope of an audiologists' practice to serve as a hearing conservationist (American Academy of Audiology, 2003; American Academy of Audiology 2004). Noise-induced hearing loss in children, adolescents and adults (not associated with occupational noise exposure) should be of concern to audiologists, who have the ability to influence change in health behaviors that will ultimately reduce the prevalence of non-occupational noise-induced hearing loss in the population.

CHAPTER 2

Problem: Non-Occupational Noise-Induced Hearing Loss

Noise-induced hearing loss results from "[s]ounds of sufficient intensity and duration" that "damage the ear and result in temporary or permanent hearing loss" (National Institutes of Health, 1990, "What is noise-induced hearing loss?" ¶1). The National Institutes of Health Consensus Statement (1990) reports that noise has contributed to at least one third of prevalent hearing loss. Furthermore, it notes that nationally in the year 1990, 20 million individuals receive doses of noise at high enough levels to cause permanent damage to hearing. Just six years later, the number of those exposed to occupational noise alone was estimated at 30 million (National Institute for Occupational Safety and Health, 1996).

Differences from Occupational Hearing Conservation

Though the NIH statement remarks that occupational noise exposure is the primary component to this statistic, a portion of the reported noise exposure is non-occupational. This is most simply described as noise-exposure sustained outside of the line of work. It may be easiest to describe non-occupational noise exposure, hearing loss and hearing conservation in contrast to occupational noise exposure. This not only casts non-occupational NIHL in the light of a familiar issue, but exposes the differences

between the two matters, accentuates the problem, and underlines the need for unique approaches to hearing loss prevention in the public sector.

Sources of noise. Sources include music—live and recorded, power tools, lawn equipment, vehicles, appliances and the use of firearms (Clark, 1991; National Institutes of Health, 1990). Clark (1991) summarized literature on nonoccupational noise exposure, and reported on the most commonly encountered sources of nonoccupational noise: music (concerts and that played through personal stereo systems), household appliances, power tools and equipment, and firearms. He wisely described not only on the levels of sound likely to be encountered in these activities, but also on probable exposure times and listening habits of those engaged in the activities. Therefore, while the level of music encountered at a classical or jazz concert may exceed NIOSH's 85 dBA recommended exposure limit (National Institute for Occupational Safety and Health, 1996), it is unlikely to damage hearing in most listeners because it does not exceed the 85 dBA time-weighted average (Clark, 1991). Individuals at rock concerts, however, incur the risk of hearing loss because of the level of music and listening duration (Clark, 1991).

Clark also recounted a number of studies which investigated the sound levels and use of personal stereo systems (PSS), with which earphones are frequently used. At the time of Clark's review, this included stereo systems and cassette players. In the intervening years, research has also been published on portable compact disc players (Fligor & Cox, 2004). Within the past three years, the use of personal stereo systems—and personal mp3 players in particular—has become the most highly publicized potential cause of NONIHL, if it was not already. This was principally due to a flurry of news articles across the nation in 2005 (Fligor & Ives, 2006), but was fueled by a class action

lawsuit filed against Apple in February 2006 for the level of sound its popular iPod personal mp3 player was capable of producing (Boudreau, 2006). Studies on the level and use of personal mp3 players have commenced (Fligor, 2007). In general for PSS, reports vary, but PSS are capable of producing sound at levels that could damage hearing. The potential to do so, however, depends greatly on the personal listening habits of the user (Clark, 1991; Fligor & Cox, 2004).

Though loud music receives the most attention from the media, it is not the only source of nonoccupational noise. Clark comments on the paucity of information available on the sound-producing capabilities of household appliances and home devices. He notes that overall, most pose little risk of causing hearing loss. However, he specifically mentions the risk posed by leaf blowers, chain saws, and surprisingly, the ringer on cordless phones.

Finally, the hazards of firearms on hearing are quite familiar to those in the field of audiology. Clark reiterates that some firearms are capable of producing sounds so loud that those who fire without hearing protection risk acoustic trauma. He also cites several studies that investigate the resulting notched or asymmetrical sensorineural hearing losses that may result from firearm use.

	Occupational	Non-Occupational
Sources of noise	Tools, equipment, firearms, vehicles	Some overlap-also personal stereo systems
Population at risk	Finite	Everyone?

Figure 3: Comparison between ONIHL and NONIHL: Sources of noise and population at risk

Population at risk. The population at risk for occupational NIHL is large, but can be narrowly defined, as the majority of jobs in the United States do not present enough of a noise hazard to be of concern, and therefore, the population at risk for ONIHL is limited to those workers in noise-hazardous work environments. In contrast, the population at risk for NONIHL is really anyone who might be exposed to noise that might cause hearing loss. When the issue is so broadly framed, there are few people who are *not* at risk for NONIHL, as everyone, at some point, may be in a circumstance in which noise assaults are present. Literature indicates that even a fetus may be risk for noise-induced hearing loss when an expectant mother is exposed to noise (Pierson, 1996).

Already this presents a problem when thinking ahead to prevention of NONIHL. That is, how can audiologists address a problem which is so broad that it has the potential to affect every member of the population?

Surveys of noise exposure can at least more narrowly define the population at risk, or more accurately, can identify the prevalence of exposure to noise. This exposure can begin at a very young age, as was already suggested by Pierson's literature review. Thousands of children between the ages of 6 and 19 years old were examined as part of the Third National Health and Nutrition Examination Survey (NHANES III) (Niskar et al., 2001), and noise-induced threshold shifts (NITS) were found in 12.5%. Niskar et al. extrapolate and estimate that 5.6 million children nationwide experience NITS. Furthermore, the prevalence of NITS was higher in boys and adolescents age 12 and older. Nevertheless, those younger than age twelve are not unaffected by noise. It is reported that a small but significant (2.5) percentage of seven-year old children

experienced tinnitus—an indicator of damage to hearing—following noise exposure (Holgers, 2003).

Mandated programs. Regulations of occupational noise exposure were not in place until the 1950s, and then only in the military. By 1970, with the Occupational Safety and Health Act, means were in place to regulate working conditions and hazardous noise (National Institute for Occupational Safety and Health, 1998a). Workplace laws and regulations not only entail the dedication of employer funds and resources to the issue, but necessitated the creation of hearing conservation and preservation programs that contained the following components, as recommended by the National Institute for Occupational Safety and Health (1996): monitoring hearing hazards in the work environment, the implementation of engineering and administrative controls, audiometric evaluation, the use of personal hearing protection devices, education and motivation, record keeping and program evaluation.

Mandated Programs	Occupational	Non-Occupational
Noise monitoring	Dosimeters, sound level meters	No
Engineering/ administrative controls	Military /Industry Regulations, OSHA	EPA, Noise Control Act
Audiometric Testing	Yes	No
Hearing protection	Yes	No
Education and motivation	Yes	Yes
Record keeping	Yes	No
Program Evaluation	Yes	No

Figure 4: Comparison between ONIHL and NONIHL: Components of mandated programs

There is no parallel system in place for non-occupational noise exposure. As mentioned earlier, it would be impractical and a colossal waste of resources to

implement a similar program in the public sector. However, engineering and administrative controls have been implemented in part, if one can categorize environmental noise pollution laws as such. In 1970, the Environmental Protection Agency (EPA) was created under the National Environmental Policy Act of 1969 (NEPA, Public Law 91-190). One purpose of this act was "to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man" (sec. 4321), and ensured that that the environmental impact of federal projects—including the effect of noise on the environment and individuals—would be thoroughly examined before projects were undertaken. The grandbaby of NEPA was promulgated two years later as the Noise Control Act (1972), which stipulated the creation of regulations for environmental noise, chiefly in "transportation vehicles and equipment, machinery, appliances, and other products in commerce" (sec. 2). EPA's Office of Noise Abatement and Control had the responsibility of overseeing products and processes affecting the public (Brookhouser, 1994). While this federal law took some ownership of noise control, it left much of the problem to state and local governments.

But what of the other elements of a hearing preservation/conservation program recommended by NIOSH? It simply is not possible to place sound dosimeters on every U.S. citizen, to have each person undergo audiometric testing on an annual basis, and there are certainly not enough audiologists to do the work. Indeed, the only element of the NIOSH program that might feasibly be addressed is that of education and motivation, which will be discussed further. By educating the individual, hearing conservation and preservation efforts would be self-directed. That is, each person ought to be responsible for preserving his or her own hearing.

This is an optimistic approach to the issue, since many people are not even aware of the hearing hazards of noise. For example, in 1998, 32% of respondents on the Healthstyles survey were exposed to noise from loud equipment or appliances at home but were unaware of the potential for hearing loss and 44% of respondents do not know that they have access to hearing evaluations (National Institute for Occupational Safety and Health, 1998b). This essentially means that those most capable of protecting their hearing are oblivious of the need to do so, as well as available resources should a decrease in hearing occur.

Dedicated professionals. Audiologists and physicians oversee occupational hearing conservation programs and audiologists or trained technicians administer periodic hearing tests for audiologic monitoring. An industrial hygienist may often play an active role, and health communications experts are consulted about how to construct materials and present information. These professionals and staff receive training and compensation for specifically for this purpose. Conversely, far fewer individuals have made a full profession of the prevention of NONIHL, a practice which is not straightforwardly compensable, unlike service in hearing conservation programs funded through private or government employers.

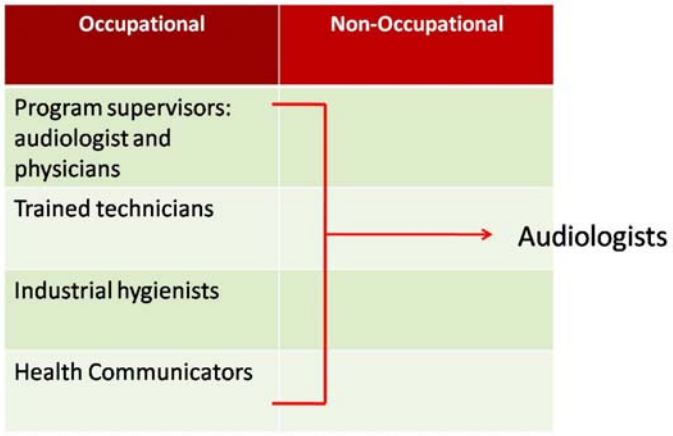

Figure 5: Comparison between ONIHL and NONIHL: Health professionals
Note: Unlike occupational hearing loss prevention programs, there are few professionals formally dedicated to non-occupational hearing loss prevention. Audiologists are the professionals most well-suited for that role.

The magnitude of this disparity is difficult to quantify. One might conjecture that an estimate of occupational hearing conservation professionals might be found through the Council for the Accreditation in Occupational Hearing Conservation, which is comprised of representatives of nine related organizations, including the American Academy of Audiology and American Speech-Language-Hearing Association ("Component Organizations," 2007). This information is not readily available, however, and even if it were, it would prove nearly impossible to quantify the number of people who devote themselves to the prevention of hearing loss due to non-occupational noise exposure. While there are professional organizations devoted to occupational hearing conservation and hearing conservation in general, there is no central organization for the prevention of NONIHL.

Carefully researched, concise messages. As noted earlier, a crucial component of hearing conservation efforts lies in educating the individual on the damaging effects of noise on hearing and the means to protect oneself from the noise exposure. Educational efforts predominantly occur in one of two forms: didactic interactions and targeted messages. The best messages are succinct, conveying a meaningful message with brevity. Targeted messages used in occupational hearing conservation efforts have an advantage in that educational materials and messages are researched, designed and disseminated using principles of health promotion and theories of health behavior, such as the Health Belief Model, Theory of Reasoned Action, and Health Promotion Model (National Institute for Occupational Safety and Health, 1996). Furthermore, using these principles, significant content is communicated concisely. For example, the principle of simplicity in a message is extremely evident in the "Roll, Pull, Hold" method of inserting foam

earplugs ("How to Wear Soft Foam Earplugs," n.d.), developed by a health communicator employed full time at the National Institute of Occupational Safety and Health in Pittsburgh, PA (personal communication, March 2007). Another illustration is described by Murray-Johnson et al. (2004). In preparation for hearing preservation efforts amongst miners in Appalachia, extensive research was conducted by health communicators within the context of the Extended Parallel Process Model. This revealing investigation examined miners' knowledge, beliefs and behaviors toward hearing protection and their ideas about NIHL. Recommendations for health promotion—such as how to best disseminate messages about NIHL were based on feedback obtained in focus groups. NIHL messages developed from the focus group were distributed in the form of humorous stickers intended for placement on mining safety helmets.

If there is extensive health behavior and promotion research in the shorter NONIHL messages for the public, it is less transparent, or perhaps more likely, less well-published. Although it is truly unfair to compare the best of ONIHL messages to the worst of NONIHL, if we examine the shorter NONIHL messages next to the brief ONIHL messages, the former seem to have a higher informational density and focus on the

Occupational	Non-Occupational
Designed using principles of health promotion/theories of health behavior	?
Concise	Sometimes
Researched by health communicators	?

Figure 6: Comparison between ONIHL and NONIHL: Messages
Note: Occupational messages about noise and its effects on hearing are more transparently researched and designed than messages targeted to the general public.

NIOSH-recommended 85 dBA recommended exposure limit, which can be a difficult concept to convey in a single public service announcement. Why is this so? It is probable that there is simply more information to convey to the public. In the work place, much of the burden of hearing conservation efforts is assumed by professionals. They are paid to concern themselves with the noise dose, engineering and administrative controls, need for hearing protection and audiometric testing so that the employee can devote his or her energies to employment tasks. The public, on the other hand, must be fully informed about the hazards of noise and prepared to assume these tasks on their own.

CHAPTER 3

What Should Be Done

As stated earlier, hearing conservation efforts are well within the scope of practice for audiologists. Furthermore, if audiologists are the hearing experts they claim to be, hearing conservation is less discretionary and more of a responsibility. NIOSH, however, advocates a mindset of hearing loss prevention over hearing conservation (Franks, Stephenson, & Merry, 1996). The distinction accentuates a move from maintaining "the hearing that is present, regardless of whether it is impaired or not," to "avoid[ing] creating hearing loss" (p. iii). The latter approach is in congruence with the Healthy People objectives, which do not propose to "avoid increasing the proportion of the population with noise-induced hearing loss," but rather reduce this proportion. This implies an attitude of prevention over conservation "and that it is within one's own purview to employ techniques, use behaviors, and rely upon personal protective equipment to prevent impairment" (Franks, Stephenson, & Merry, 1996, p. iii).

Anyone who has brushed or flossed, worn sunglasses, or altered diet and exercise to maintain periodontal, ocular and general health has had experience with preventive medicine. Much of the advocacy for preventive measures happens in routine office visits to the dentist, optometrist and primary care physician. Unfortunately, audiology is unlike

other health professions that strongly advocate preventive health measures in that most people do not regularly visit an audiologist. In fact, according to the NIOSH Healthstyles survey, less than half (39%) of those surveyed have had a recent hearing test (within at least 3 years) and 21% of adults age 65 years and older report that they have never had their hearing evaluated (National Institute for Occupational Safety and Health, 1998b). Therefore, an audiologist who wishes to have an impact will have to explore other avenues for advocacy.

One might be tempted to call sufficient the news media and nationally-aired public service announcements—predominately in regards to NIHL and personal mp3 players. While national media does draw attention to an important issue, it would be wholly inadequate to single-handedly accomplish the objectives declared earlier. First of all, the national media has been focused chiefly on the damage from personal mp3 players, while drawing little attention to other common noise hazards. Furthermore, the information in the news media was often distorted or truncated (Fligor & Ives, 2006), leaving news consumers with inaccurate or incomplete ideas about the risk of hearing loss from personal mp3 players and how to prevent it. A brief analysis of the news messages found them insufficient to prevent NIHL from personal mp3 players in teenagers (Winder, 2006). Moreover, reliance on only one method to advocate healthy behaviors is ineffective ("Health Communication", n.d.).

So what can be done? At least when it comes to preventing NIHL in children, Niskar et al. (2001) recommended adapting “education, training, audiometric testing, exposure assessment, hearing protection and noise control” to the needs of children (p. 43), as well as extensive research to examine the best means of addressing each of these

components. These mechanisms sound remarkably like those recommended by NIOSH for hearing loss prevention programs (1996). To reiterate, a full scale hearing loss prevention program like that advocated by NIOSH would be costly and impractical, but we will address two that can be implemented at the level of the individual health care provider: education and research.

Education

Because prevention of NONIHL must be self-directed, the most critical thing an audiologist can do is educate people. In education and advocacy of hearing loss prevention, audiologists need to practice principles of good health communication, and do so with thoughtful and concise messages. They can use national messages to start dialogues about NONIHL, start hearing loss prevention early by assisting in hearing conservation programs in schools, and incorporate education about hearing loss prevention into daily clinical practice.

Principles of health communication and promotion. Healthy People 2010 identified objectives for health communication that can apply to any provider ("Health Communication", n.d.). Part of this objective is to ensure that health professionals are familiar with and practice successful communication techniques. Good communication skills are a crucial part of healthcare no matter the discipline.

Part of health communication is also understanding the role that education plays in health behavior. Models of health behavior and theories of health promotion can assist in determining how to present information in a way that will be most liable to influence behaviors for hearing loss prevention. By becoming familiar with these principles,

audiologists increase their ability to positively influence those whom they seek to educate.

Thoughtful, concise messages. Advocated practices are most likely to be implemented when they are communicated in a simple, straightforward manner. Unfortunately, the time-weighted average, which is merely a time-dosage concept applied to noise exposure, is not always the easiest concept to understand. Additionally, most people do not carry a sound level meter or dosimeter to monitor their level of noise exposure. This illustrates the need for clear, easy-to-remember guidelines about how and when hearing needs to be protected.

National messages as a springboard. While news reports and national messages may be insufficient by themselves to produce change in health behaviors, they can be used to start dialogues that provided another avenue for education. Targeted messages about NONIHL have reached the public through public service announcements, press releases, music and interactive websites through such organizations as the American Speech-Language-Hearing-Association (American Speech-Language-Hearing Association [ASHA], 2006; ASHA, 2007; ASHA, n.d.) and the American Academy of Audiology (AAA, 2007). Audiologists can use timely news reports and public service announcements to turn any conversation into one on hearing loss prevention, a technique known as "bridging."

School programs. If the goal is the prevention of hearing loss rather than hearing conservation, then information should be presented before exposure has occurred (Franks, Stephenson, & Merry, 1996). It follows that the earlier people are educated about the effects of noise, the less likely they are to have already incurred damage. This

suggests that the best time to begin education on the effects of noise is when individuals are young. A number of experts have seen the merit in tailoring hearing conservation programs to school age children and adolescents. Folmer, Grist and Martin (2002) saw NIHL as enough of a public health threat that they proposed that "[h]earing conservation should receive attention and resources similar to those allocated for anti-smoking, anti-drug, teen pregnancy, and sexually transmitted disease education programs that are now presented routinely in public schools" (p. 57).

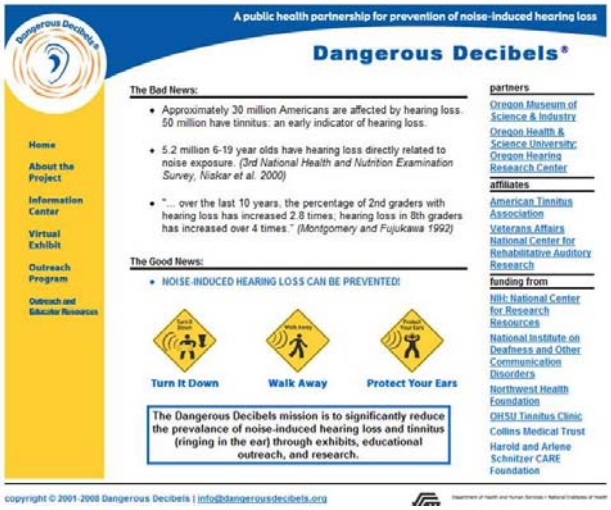

Figure 7: Dangerous Decibels Web site
Note: A number of school hearing loss prevention programs already exist. One such program, *Dangerous Decibels*, teaches children about the mechanisms of hearing, noise hazards and effects of noise, and how to prevent hearing loss. Activities are also designed to fulfill national learning objectives and educational requirements.
Dangerous Decibels. (2001). Retrieved May 8, 2008 from Dangerous Decibels Web site, http://www.dangerousdecibels.org

Advocacy during office visits. As mentioned before, many people may never see an audiologist, but this is the component of education that would be the easiest to implement on a daily basis. Most patients present clinically because they have already experienced some degree of hearing loss, and hearing loss prevention now transitions to a matter of hearing conservation. At the author's clinical practicum site, patients are briefly educated—or depending on their prior experience, reminded—of principles of hearing preservation as a routine part of counseling on test results following a hearing evaluation. Basic guidelines can be

communicated in a short period of time, and the patient can be fit with hearing protection at the end of the appointment. While studies report variable results on the quality of the patient-doctor communications on patients' compliance with a provider's recommendations, care should be taken to communicate necessary information in language that is understandable to the patient (Ong, de Haes, Hoos, & Lammes, 1995).

Research

While a great deal of research has already been conducted on NONIHL, there are a number of unexplored avenues, especially in the investigation of noise hazards that are not related to music. Formative and evaluative research is needed to continually examine the best methods for hearing loss prevention and the best ways of communicating about noise hazards to the public.

CHAPTER 4

Conclusion

It would be easy to think that the scope and ambition of even one of the Healthy People 2010 goals is overly optimistic. This is particularly because of the vast population encompassed by the objective for noise-induced hearing loss, and partially because the pursuit of these objectives is entirely voluntary. Additionally, it is difficult to measure what are likely to be small changes in a relatively short period of time.

Nevertheless, the very nature of public health is large scale, and significant changes, however small, can be affected by a great number of incidental acts. It seems that the last thought can be summarized and accomplished by the trite admonition to "think globally and act locally" when it comes to hearing health in the United States. Though oft-repeated, there is some inherent wisdom in the phrase. Basically, there is no more appropriate profession to enact changes in the public's hearing health than that of audiology. And if that is to happen, individual audiologists should take initiative on a local, personal level through educational and research efforts. It would be impractical to think that any one audiologist could devote him- or herself entirely to each of these areas. Indeed, that is not the intent. Though some activities (the creation of messages and materials based on established principles of health communication, for example) may

require learning new skills, each person can examine his or her resources and select activities that can be practically incorporated into his or her professional practices.

It is an oversimplification to claim that there is one solution to achieving the immediate objectives set forth in Healthy People 2010. Nevertheless, it would also a miscalculation to underestimate the impact that one audiologist can have on these objectives. All it requires is that each person takes personal ownership of the objectives and effect change in his or her own sphere.

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